

generated by the bow, so as to recapture energy from said bow waves, and (iii) means for aerating water along the hull to reduce frictional drag and to reduce wave generation from an aft end of the watercraft.--

REMARKS

Reconsideration and allowance of the above referenced application is respectfully requested.

A concurrently filed amendment to the drawings is also filed for consideration. The amendment to the drawings is provided only for purpose of improving readability of the application. No new matter has been submitted for entry into the application.

The specification is amended only for purpose of providing additional reference indicia for the drawings of the application and to improve readability and understanding of the drawings. The above amendments to the specification are entirely supported by the specification with claims and drawings as originally filed. For example, Figure 1 clearly supports the amendment to the specification at page 5, line 1, where the "outer skirts" are "in the form of a port skirt 18A and a starboard skirt 18B". As depicted in Figure 1, the "outer skirts" clearly include a port and a starboard skirt, terminology that one of ordinary skill in the art would understand when viewing the drawings as filed. Similarly, the amendment to the specification at page 5, line 30, wherein terms descriptive of the drawings as originally filed have been inserted "(a port inner skirt 26A and a starboard inner skirt 26B) does not constitute new matter. The amendment simply provides descriptive terms and reference numbers, which would be logical and clearly understood to one of ordinary skill in the art based upon the

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ROBINSON et al. - APPLICATION NO. 09/399,468

drawings as originally filed. No new matter has been submitted for entry into the specification.

Claims 1-21 are currently present in the application. Claims 1-18 have been amended to more clearly define the invention. New claims 19-21 are submitted for consideration. The amendments to the claims and the newly submitted claims are fully supported by the specification, claims and drawings of the application as originally filed. No new matter has been added.

Claims 2, 3-8, 11, 12, 14 and 15 are rejected under 35 U.S.C. § 102(b) as being clearly anticipated by Tatter (U.S Patent 2,989,939). This rejection is respectfully traversed.

The present invention addresses various problems associated with waves generated by watercraft by providing a design that recaptures the bow wave for significantly improved operation. As now claimed, the Applicants' invention provides port and starboard skirts, which flank the port and starboard sides of a displacement hull to form port and starboard channels that capture the bow wave. As a result of the Applicants' invention, efficiency improves and waves decrease.

The present invention enjoys recognition and commercial success, including use by the Venetian Transit Authority to overcome a long-felt need for decreasing the boat waves that destroy Venetian canal walls and foundations and even overturn traditional romantic gondolas. The unexpected increased efficiency and speeds in the 75-knot range apply to many other applications, including ferries and military use as a high-speed launch platform. The invention as now claimed is not anticipated nor rendered obvious by the disclosures of the cited prior art and the advantageous which result from the use of the Applicants' invention can not be

attained by other boat hulls.

Tatter shows a multi-hulled watercraft with keel-like structures 11b that are not "outer skirt structures" as described, illustrated, and now claimed for the instant invention. The hull of Tatter does not form the arcuate first and second channels required in the claims of the present application. They form inverted V-shaped wells 14 that are not adapted to function in the manner of the first and second channels of the instant invention.

The outer skirt structures of the Applicants' invention are generally flat, vertical, and parallel below the static waterline in order to capture bow waves and direct them into the first and second channels. The specification states that they "...are substantially perpendicular with respect to the static waterline 5 (FIG. 2) to minimize wave generation" (paragraph beginning on Page 5, line 13). Amended Claim 1 specifies that each of the outer skirt structures has "an outer surface that is substantially perpendicular with respect to the static waterline..." and each of the channel-defining structures defines a channel "with a cross-sectional surface that is generally arcuate." Amended Claim 1 also specifies, "The first and second channels extending from the fore end to the aft end and the first and second channels being adapted to capture a bow wave and to cause air and water to mix and spiral toward the aft end of the hull as compressed aerated water, thereby reducing friction drag, increasing lateral stability, and dampening transmission of bow wave energy at the aft end of the hull."

These limitations cannot be met by the disclosure of Tatter. The Tatter disclosure is based exclusively on "... a plurality of contoured longitudinally extending substantially parallel keel-like portions, each portion being substantially 'V' shaped in lateral cross section ..." This

clearly differs from the Applicants invention, which can be described as an "M" Hull, in structure and function.

In the hull structure of Tatter, the disclosure teaches a multi-hulled watercraft for which each displacement hull is of almost identical shape with sides of the outside hulls conforming to the shape of the hull, and thus are neither flat, vertical, nor parallel below the static waterline.

In contrast, the Applicants invention is a hull with vertical flat parallel outer surfaces on the skirts both above and below the static waterline which are tapered on the inner surface only as required to form the two arcuate wing channels.

The well (or channel) structure of Tatter is consistently described in the specification and all ten claims as being the space between displacement hulls and is described exclusively as an inverted "V" shaped well (or channel), which would prevent spiraling of the incoming water.

In contrast, the Applicants invention is defined as having exclusively arcuate wing channels between the skirts and single displacement hull, designed to encourage continued spiraling of the bow wave as it moves aft through the channel.

With regard to the bow wave control, Tatter teaches that the outside hulls generate a substantial outward moving bow wave, especially at high speed. As is well known in the art, this situation would threaten nearby boats and structures at the water/land interface.

In contrast, the Applicants' invention requires that the skirts direct both the bow and skirt waves into the wing channels thereby eliminating substantially all outward movement of these waves, even when operating at high speed.

The air flow control in the Tatter disclosure has the effect of capturing incoming air which is held in the upper portion of the inverted "V" wells by blocking any flow aft to the stern. Intermittently some of this air is forced out the bow entrance by wave impact on the boat. There is no continuous flow of air possible in the hull disclosed by Tatter.

In contrast, the Applicants' invention traps the incoming air with the spiraling bow wave, which prevents escape at the bow entrance while forcing continuous air flow aft for escape at the stern.

In the disclosure of Tatter, water aeration is minimized by holding the low pressure air in the upper portion of the inverted "V" wells separate from the water for better cushioning.

In contrast, the Applicants' invention maximizes water aeration by forcing air under increasing pressure into the water as it flows aft in the wing channels to reduce friction drag and to dampen the transmission of wave energy exiting at the stern.

The significance of this advantage of the present invention over the hull disclosed by Tetter is that rather than seeking to provide an air cushion in the wells to counter impact from boat action in waves and thus: (i) increase passenger comfort, and (ii) protect the hulls from damage, the Applicants hull recaptures the bow wave to: (i) protect other watercraft and structures at the water/land interface, (ii) extract energy from the bow wave through compressing air, to increase planing lift, (iii) aerate the water flowing through the wing channels for reduced friction drag and for dampening the transmission of wave energy exiting the boat, and (iv) increase lateral stability under way.

From all of the above, it is clear that the disclosure of Tetter does not anticipate the structure of the Applicants' invention as now claimed and further could not possibly provide

the advantageous of the Applicants invention.

Newly presented Claim 21 specifies that each of the outer skirt structures has "an outer surface that is substantially perpendicular with respect to the static waterline..." and each of the channel-defining structures defines a channel "with a cross-sectional surface that is generally arcuate." Claim 21 also specifies, "the first and second channels being adapted to function as (i) means for directing waves generated by the bow into the first and second channels, so as to reduce lateral wave pollution from the watercraft, (ii) planing means for providing surfaces on which the watercraft is capable of planing on the waves generated by the bow, so as to recapture energy from said bow waves, and (iii) means for aerating water along the hull to reduce frictional drag and to reduce wave generation from an aft end of the watercraft." This is structure with functional adaptation that is not described or suggested by Tatter. Thus, amended independent Claim 1 and newly presented independent Claim 21 are not anticipated by Tatter under 35 USC 102(b). They are patentably distinguishable under 35 USC 102(b), along with properly dependent amended Claims 2-20.

Claim 2 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Tatter in view of Perette (U.S. Patent 5,458,078). The Applicants respectfully traverse the rejection.

The Applicants' above comments relating to the Tatter reference apply equally to the Examiner's rejection of claim 2 as being unpatentable over Tatter in view of Perette. Perette fails to make up for the deficiencies of Tatter. Although the Perette patent teaches vertical outer sidewalls, neither Perette or Tatter, taken separately or together, describe or suggest the

ROBINSON et al. - APPLICATION NO. 09/399,468

channel-defining structure specified in the amended claims that functions to perform as defined in claim 1.

This structure in the present invention directs waves generated by the bow into the first and second channels. It provides surfaces on which the watercraft is capable of planing on the waves generated by the bow. It aerates water along the hull. The claimed structure reduces lateral wave pollution from the watercraft. It recaptures energy from the bow waves. It reduces frictional drag and reduces wave generation from the aft end of the watercraft. It results in more efficient operation at greater speeds.

Neither Perette or Tatter taken alone or in combination have the structural limitations of the Applicants' invention as now claimed and neither of the references is capable of obtaining the advantages claimed by the Applicants.

In the Examiner's combination of the Tatter and Perrette disclosures, the vertical side alternative is limited to the surface of the outer hull above the static waterline (see Tatter Figs. 6-10) as the submerged portions must conform to the hull shape and thus would not be flat, parallel, or vertical.

In contrast, the Applicants' invention, which can be described as an "M" Hull, is distinguished in that the outside surface of the skirts must be flat, parallel, and vertical below the static waterline to function effectively. This is not the case with the combination of Tetter and Perrette.

For the above reasons, the Applicants respectfully request withdrawal of the rejection of claim 2.

ROBINSON et al. - APPLICATION NO. 09/399,468

Claims 9 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tatter in view of Russell. The Applicants respectfully traverse the rejection.

The Applicants' above comments relating to the Tatter reference apply equally to the Examiner's rejection of claim 2 as being unpatentable over Tatter in view of Russell. Russell is cited by the Examiner only as teaching the use of serrations. Russell fails to make up for the earlier discussed deficiencies of Tatter.

The disclosure of Russell describes "random impressions" over the entire undersurface of the tunnels to relieve vacuum suction for improved lift.

In contrast, the Applicants invention defines serrations in the form of a series of longitudinally parallel "V" shaped hydrodynamic fins mounted on the undersurface of the displacement body and wing channels for a short distance forward of the transom to disperse the flow of aerated water from the channels and from the propeller wake for further dampening of the transmission of remaining boat-generated wave energy. This is not what is taught by the disclosure of Russell.

For this reason, the Applicants respectfully request withdrawal of the rejection of claims 9 and 10.

Claims 13 and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tatter. The Applicants respectfully traverse the rejection.

The Applicants above remarks relating to Tatter apply equally to the present rejection of claims 13 and 18. Accordingly, withdrawal of the Examiner's rejection is respectfully requested.

Claim 16 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Tatter in view of Szptyman. The Applicants above remarks relating to Tatter apply equally to the present rejection of claim 16. Szptyman is cited by the Examiner solely for the purpose of teaching the use of two propellers. Szptyman fails to make up for the deficiencies of Tetter discussed above. Accordingly, withdrawal of the Examiner's rejection is respectfully requested.

Claim 17 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Tatter in view of Labrucherie et al. The Applicants respectfully traverse the rejection.

The Applicants above remarks relating to Tatter apply equally to the present rejection of claim 16. Labrucherie et al. is cited by the Examiner solely for the purpose of teaching the use of inner skirts.

Labrucherie et al. suggests a swinging flap, mounted in each tunnel hinged horizontally at the mid-length of the boat with control means to adjust the air flow and thereby the tilt of the boat. This cannot possibly be described as a skirt as that term is used for the instant invention.

In contrast, the Applicants invention defines fixed parallel slender fins mounted longitudinally at the edge of the displacement body extending aft from about the point of maximum beam to beyond the propeller(s) forming an inner fixed skirt, isolating the aerated water from the solid water flow under the displacement hull to prevent propeller cavitation.

The teaching of swinging flap by Labrucherie et al. fails to make up for many deficiencies of Tetter discussed above. Accordingly, withdrawal of the Examiner's rejection is respectfully requested.

In view of the above amendments to the claims and the foregoing remarks, the

ROBINSON et al. - APPLICATION NO. 09/399,468



Applicants respectfully assert that all of the Examiner's objections and rejections have been overcome. Accordingly, early and favorable notice of allowance of the present application is respectfully requested.

Respectfully submitted,

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